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L4	1006	edge near2 contract\$5	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB
L5	3	4 and homeomorph\$8	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB
L6	1	6108006.PN.	USPAT
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Results of search set L7:

US 6735630 B1	Method for collecting data using compact internetworked wireless integrated network sensors (MINS)	20040511	709/224
US 6731270 B2	Piezoelectric transducer for data entry device	20040504	345/173
US 6704619 B1	Method and system for universal guidance and control of automated machines	20040309	700/245
US 6690841 B2	Method and apparatus for image registration	20040210	382/294
US 6671625 B1	Method and system for signal detection in arrayed instrumentation based on quantum resonance interferometry	20031230	702/20
US 6650975 B2	Multifunctional mobile appliance	20031118	701/23
US 6642929 B1	Image search method, based on an invariant indexation of the images	20031104	345/581
US 6611738 B2	Multifunctional mobile appliance	20030826	701/23
US 6600981 B2	Multifunctional mobile appliance	20030729	701/23
US 6578017 B1	Method to aid object detection in images by incorporating contextual information	20030610	706/3
US 6571193 B1	Method, apparatus and system for recognizing actions	20030527	702/141
US 6556195 B1	Image processing device and image processing method	20030429	345/419
US 6502017 B2	Multifunctional mobile appliance	20021231	701/23
US 6501537 B1	Range finding	20021231	356/3.14
US 6459951 B1	Direct laser additive fabrication system with image feedback control	20021001	700/166
US 6452596 B1	Methods and apparatus for the efficient compression of non-manifold polygonal meshes	20020917	345/440
US 6445390 B1	Triangle geometry processing for surface modeling and cartesian grid generation	20020903	345/421

US 6424340 B1	Marking device for electronic presentation board	20020723	345/173
US 6415227 B1	Enhanced global positioning system and map navigation process	20020702	701/213
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US 6377865 B1	Methods of generating three-dimensional digital models of objects by wrapping point cloud data points	20020423	700/98
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US 5583795 A	Apparatus for measuring eye gaze and fixation duration, and method therefor	19961210	702/150
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US 5315537 A	Automated quadrilateral surface discretization method and apparatus usable to generate mesh in a finite element analysis system	19940524	716/20
US 5057859 A	Camera having high-precision stop function for movable unit	19911015	396/49
US 4974165 A	Real time machining control system including in-process part measuring and inspection	19901127	700/193
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US 20040012544 A1	Method and apparatus for reducing distortion in images	20040122	345/32
US 20040006478 A1	Voice-interactive marketplace providing promotion and promotion tracking, loyalty reward and redemption, and other features	20040108	704/275
US 20030209893 A1	Occupant sensing system	20031113	280/735
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US 20030112239 A1	Method of mesh simplification via uniform spatial division PFN/TRAC system™ FAA upgrades for accountable remote and robotics control to stop the unauthorized use of aircraft and to improve equipment management and public safety in transportation	20030619	345/428
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US 20020049521 A1	Multifunctional mobile appliance	20020425	701/23
US 20020049517 A1	Multifunctional mobile appliance	20020425	701/1
US 20020035474 A1	Voice-interactive marketplace providing time and money saving benefits and real-time promotion publishing and feedback	20020321	704/270
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US 20010037191 A1	Three-dimensional beauty simulation client-server system	20011101	703/6
US 20010019325 A1	Optical coordinate input/detection device with optical-unit positioning error correcting function	20010906	345/157
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polyhedron Y. There is just one minimal **triangulation** of Y, namely that one in which every vertex
trees belong to the same open cube if they are **homeomorphic** in a fashion which preserves labels and **edges**
every vertex is either an end (belongs to just one **edge**, called a free **edge**) or a node (belongs to at
zeus.math.univ-paris13.fr/~sarah/papers/paper.ps

[Triangle-Mesh Simplification using Error Polyhedra - Mark Eastlick And \(2001\)](#) (Correct)

Unlike many other approaches, we perform **triangulation** in three-dimensions and utilise this extra
whose star $S(i)$ is topologically equivalent, or **homeomorphic**, to a disc (fig. 3) A mesh is called
on vertex decimation, as opposed to the common **edge-collapse** operation. Our basic simplification
www.dcs.shef.ac.uk/~marke/pubs/ErrorPolyhedraEGUK.pdf

[How to Make a Triangulation of . . . Polytopal - King \(2000\)](#) (Correct)

Simon A. King How To Make A **Triangulation** Of S^3 Polytopal Draft Version. September
M, and the task is to recognize whether M is **homeomorphic** to S^3 or not. Starting with T, the
local moves, e.g. stellar subdivisions along **edges** [A] or bistellar moves [Pa] In general, there
www-irma.u-strasbg.fr/irma/publications/2000/00035.ps.gz

[A Simple Construction of High Representativity Triangulations - Przytycka, Przytycki \(1993\)](#) (Correct)

we do not decrease the representativity of the **triangulation**. Let $T(n)$ be a **triangulation** of 6 obtained
if neither of the components of $60C$ is **homeomorphic** to an open disc. A graph is said to be
e i f i be respectively the number of vertices, **edges** and faces after the i th iteration. By Euler's
grserv.med.jhmi.edu/~przytyck/cycles3.ps.Z

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6. ☐ **Experimental results on quadrangulations of sets of fixed points**, *Computer Aided Geometric Design, Volume 19, Issue 7, July 2002, Pages 533-552*
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7. ☐ **Converting triangulations to quadrangulations^{*1}**, *Computational Geometry, Volume 9, Issue 4, March 1998, Pages 257-276*
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 and their speed is bounded by the rate at which **triangulation** data can be sent into the machine. To reduce
ams.sunysb.edu/pub/geometry/esa94.ps.gz

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 Ramos, P. and G. T. Toussaint, Converting **triangulations** to qua drangulations,manuscript in
 automatic mesh genera tion and the Delaunay **triangulation**,International Journal for Numerical
 iper algorithm gives significantly nicer **quadrangulations** than the SI algorithm. It would be
www-cgri.cs.mcgill.ca/~godfried/publications/quad.wads.ps.gz

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A Local Regularization Operator For Triangular And.. - Bernardi Girault (1995) (Correct) (3 citations)
 set with a polygonal boundary #Let T h be a **triangulation** or **quadrangulation** off# and let #h be a
 Recall (cf. Ciarlet [5, Chap. II])that a **triangulation** T h off# is a partition of off# into nondegenerate
 boundary #Let T h be a **triangulation** or **quadrangulation** off# and let #h be a standard associated
epubs.siam.org/sam-bin/getfile/SINUM/articles/29376.ps.Z

On Multi-Level Bases for Elliptic Boundary Value Problems - Lai, Wenston (1999) (Correct) (1 citation)
 degree d, 4 n is the nth refinement of a given **triangulation** 4 0 by using standard uniform regular
 refinement procedure, and 3 n is the **triangulation** obtained from the nth refinement of a given
 obtained from the nth refinement of a given **quadrangulation** by using uniform or nonuniform refinement
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A Disk-Packing Algorithm for an Origami Magic Trick - Bern, Demaine, Eppstein, Hayes (1998) (Correct) (1 citation)
 disks on R so that disk centers induce a mixed **triangulation/quadrangulation** respecting the boundary of
 packing has previouslybeen used to compute **triangulations** [1] and **quadrangulations** [3] with special
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www.ics.uci.edu/~eppstein/pubs/BerDemEpp-Fun-98.ps.gz

Convex Preserving Scattered Data Interpolation Using Bivariate .. - Lai (2000) (Correct) (1 citation)
 C 3 (Omega\Gamma .If we refine the underlying **triangulation** sufficiently many times so that j j is
 space over the PowellSabin refinement of a **triangulation** of the data points to find a convex
 power of splines on triangulated **quadrangulations**, SIAM J. Num. Analysis, 36(1999)143-159.
www.math.uga.edu/~mjlai/app/convex.ps

Experimental Results on Quadrangulations of Sets of.. - Bose, Ramaswami.. (Correct)
 to solve this problem by converting "nice" **triangulations** to the desired **quadrangulations** with the aid

matchings computed on the dual graph of the **triangulations**. We report experiments on several versions of www.scs.carleton.ca/~jit/publications/papers/brtt02.ps

Efficient Algorithms for Petersen's Matching Theorem - Biedl, Bose, Demaine, Lubiw (Correct)
is exactly the collection of duals of planar **triangulations** where the outside face is a triangle. A for numerical simulations and for converting **triangulations** into **quadrangulations**, as described in guarding, adaptive mesh refinement, and **quadrangulation**. 1 Introduction In 1891, Petersen [29] www.scs.carleton.ca/~jit/publications/papers/bbd199.ps

Characterizing and Efficiently Computing Quadrangulations .. - Prosenjit Bose Godfried (1997) (Correct)
Of particular importance is the study of **triangulations** of point sets due to its many applications in may be more desirable objects than **triangulations**. A **quadrangulation** of a set of points S is a Characterizing and Efficiently Computing **Quadrangulations** of Planar Point Sets Prosenjit Bose www.scs.carleton.ca/~jit/publications/papers/bt97.ps

On The Approximation Power Of Splines On Triangulated.. - Lai, Schumaker (1999) (Correct)
(of smoothness r and degree $3r$ defined on **triangulations** which are obtained from arbitrary for constructing them) Let be the **triangulation** obtained by inserting the diagonals of each Power Of Splines On Triangulated **Quadrangulations** *Ming-Jun Lai Y Larry L. Schumaker Z www.math.uga.edu/~mjlai/papers/siamsr3r.ps

Bivariate Spline Method for Numerical Solution of Steady State .. - Lai, Wenston (1999) (Correct)
1.6 1.8 2 Figure 1. **Quadrangulation** and Derived **triangulation** of L-shaped Domain quadratic finite elements. the number of the triangles in the underlying **triangulation** while the time for solving a linear system is smoothness r and degree $3r$ over triangulated **quadrangulations**. The stream function formulation for the www.math.uga.edu/~mjlai/papers/paper37.ps

On Schwarz's Domain Decomposition Methods for Elliptic.. - Lai, Wenston (1996) (Correct)
as the number of triangles in the underlying **triangulation** is increased, which is indispensable for method using an appropriate spline space over a **triangulation** Δ , reduces the PDE problem to a linear using C^1 cubic spline functions over a **quadrangulation** of the given domain. The computer www.math.uga.edu/~mjlai/papers/paper33.ps

On C^2 Quintic Spline Functions Over Triangulations of.. - Lai (1996) (Correct)
On C^2 Quintic Spline Functions Over **Triangulations** of Powell-Sabin's Type Ming-Jun Lai Abstract. Type Ming-Jun Lai Abstract. Given a **triangulation** \mathcal{T} of a polygonal domain, we find a refinement type may be obtained from a special type of **quadrangulation**. For an arbitrary **quadrangulation** Lai and www.math.uga.edu/~mjlai/papers/paper28.ps

Bivariate Spline Method for Navier-Stokes Equations: Domain.. - Lai, Wenston (Correct)
convex quadrilaterals and be the special **triangulation** obtained from by adding the two diagonals of of an L-shape domain and the derived **triangulation**. Let $S \subset \Omega$ (fs $2 \subset \Omega$) Γ space to solve these equations. Let be a **quadrangulation** of Ω which consists of non-degenerate www.math.uga.edu/~mjlai/papers/lai.ps

Bivariate Spline Spaces on FVS-triangulations - Lai (Correct)
Bivariate Spline Spaces on FVS-**triangulations** Ming-Jun Lai Abstract. FVS-**triangulation** is a FVS-**triangulations** Ming-Jun Lai Abstract. FVS-**triangulation** is a special but very flexible over such **triangulations**. x1 Introduction A **quadrangulation** is a union of convex quadrilaterals www.math.uga.edu/~mjlai/papers/paper31.ps

Acyclic List 7-Coloring Of Planar Graphs - Borodin, Fon-Der Flaass, Kostochka (2001) (Correct)
is based on a structural property of the plane **triangulations** (loops and multiple edges are allowed) which by itself. The weight, $w(f)$ of a face f in a **triangulation** is the degree sum of its boundary vertices. them as new vertices. The result is a **quadrangulation** with all faces of the type $(3 \ 4 \ 4 \ 4)$ By dept-info.labri.u-bordeaux.fr/~sopena/Papiers/Comprimes/bfkr01b.ps.gz

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1 [O\(nlog log n\)-work parallel algorithms for straight-line grid embeddings of planar graphs](#)

Martin Fürer, Xin He, Ming-Yang Kao, Balaji Raghavachari

June 1992 **Proceedings of the fourth annual ACM symposium on Parallel algorithms and architectures**

Full text available: [pdf\(1.02 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

2 [Efficient algorithms for Petersen's matching theorem](#)

Therese C. Biedl, Prosenjit Bose, Erik D. Demaine, Anna Lubiw

January 1999 **Proceedings of the tenth annual ACM-SIAM symposium on Discrete algorithms**

Full text available: [pdf\(1.24 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

3 [A near-optimal heuristic for minimum weight triangulation of convex polygons](#)

Christos Levcopoulos, Drago Krznaric

January 1997 **Proceedings of the eighth annual ACM-SIAM symposium on Discrete algorithms**

Full text available: [pdf\(1.24 MB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

4 [Topology: Morse-smale complexes for piecewise linear 3-manifolds](#)

Herbert Edelsbrunner, John Harer, Vijay Natarajan, Valerio Pascucci

June 2003 **Proceedings of the nineteenth conference on Computational geometry**

Full text available: [pdf\(363.74 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We define the Morse-Smale complex of a Morse function over a 3-manifold as the overlay of the descending and ascending manifolds of all critical points. In the generic case, its 3-dimensional cells are shaped like crystals and are separated by quadrangular faces. In this paper, we give a combinatorial algorithm for constructing such complexes for piecewise linear data.

Keywords: Morse theory, combinatorial algorithms, computational geometry and topology, densities, triangulations

5 Hierarchical morse complexes for piecewise linear 2-manifolds

Herbert Edelsbrunner, John Harer, Afra Zomorodian

June 2001 **Proceedings of the seventeenth annual symposium on Computational geometry**

Full text available:  [pdf\(579.05 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present algorithms for constructing a hierarchy of increasingly coarse Morse complexes that decompose a piecewise linear 2-manifold. While Morse complexes are defined only in the smooth category, we extend the construction to the piecewise linear category by ensuring structural integrity and simulating differentiability. We then simplify Morse complexes by cancelling pairs of critical points in order of increasing persistence.

Keywords: algorithms, hierarchy, implementation, terrains

6 Construction of contour trees in 3D in $O(n \log n)$ steps

Sergey P. Tarasov, Michael N. Vyalys

June 1998 **Proceedings of the fourteenth annual symposium on Computational geometry**

Full text available:  [pdf\(1.16 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

7 Primitives for the manipulation of general subdivisions and the computation of Voronoi

Leonidas Guibas, Jorge Stolfi

April 1985 **ACM Transactions on Graphics (TOG)**, Volume 4 Issue 2

Full text available:  [pdf\(3.55 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The following problem is discussed: given n points in the plane (the sites) and an arbitrary query point q , find the site that is closest to q . This problem can be solved by constructing the Voronoi diagram of the given sites and then locating the query point in one of its regions. Two algorithms are given, one that constructs the Voronoi diagram in $O(n \log n)$ time, and another that inserts ...

Keywords: Euler operators, Voronoi and Delaunay diagrams, closest point, computational topology, convex hull, geometric primitives, nearest neighbours, planar graphs, point location, representation of polyhedra, triangulations

8 Planar graph decomposition and all pairs shortest paths

Greg N. Frederickson

January 1991 **Journal of the ACM (JACM)**, Volume 38 Issue 1

Full text available:  [pdf\(3.26 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

An algorithm is presented for generating a succinct encoding of all pairs shortest path information in a directed planar graph G with real-valued edge costs but no negative cycles. The algorithm runs in $O(pn)$ time, where n is the number of vertices in G , and p is the minimum cardinality of a subset of the faces that cover


all vertices, taken over all planar embeddings of G

Keywords: NP-completeness, all pairs shortest paths, approximation algorithm, compact routing table, graph embedding, outerplanar graph, planar graph, succinct encoding

9 Determining contractibility of curves

Haijo Schipper

July 1992 **Proceedings of the eighth annual symposium on Computational geometry**

Full text available:  pdf(775.34 KB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

10 Dynamic skin triangulation

Ho-Lun Cheng, Tamal K. Dey, Herbert Edelsbrunner, John Sullivan

January 2001 **Proceedings of the twelfth annual ACM-SIAM symposium on Discrete algorithms**

Full text available:  pdf(833.53 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


This paper describes an algorithm for maintaining an approximating triangulation of a deforming surface in \mathbb{R}^3 . The triangulation adapts dynamically to changing shape, curvature, and topology of the surface.

Keywords: adaptive meshing, algorithms, computational geometry, deformation, differential geometry, metamorphoses, proofs

11 Triangulating three-colored graphs

Sampath K. Kannan, Tandy J. Warnow

March 1991 **Proceedings of the second annual ACM-SIAM symposium on Discrete algorithms**


Full text available:  pdf(720.43 KB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

12 A new technique to compute polygonal schema for 2-manifolds with application to null-homotopy detection

Tamal K. Dey

June 1994 **Proceedings of the tenth annual symposium on Computational geometry**

Full text available:  pdf(782.31 KB)


Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We provide a new technique for deriving optimal sized polygonal schema for triangulated compact 2-manifolds without boundary in $O(n)$ time, where n is the size of the given triangulation T . We first derive a polygonal schema P embedded in T using Seifert-Van Kampen's theorem. A reduced polygonal schema Q of optimal size is computed from P , where a surjective mapping from the ...

13 Planar separators and parallel polygon triangulation (preliminary version)

Michael T. Goodrich

July 1992 **Proceedings of the twenty-fourth annual ACM symposium on Theory of computing**


Full text available:  pdf(999.01 KB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

14 QMESH: an interactive visualization tool for quadrilateral mesh-generation

Michael Orr

January 2001 **The Journal of Computing in Small Colleges**, Volume 16 Issue 2

Full text available:  pdf(181.90 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

QMesh, my undergraduate research project, involves the design, implementation, and experimental evaluation of algorithmic techniques for quadrilateral mesh-generation. A large percentage of this project is the study of techniques for converting triangulations to quadrangulations. This paper is geared towards the understanding of implementation issues that are involved in computing the triangulation of a simple polygon and its dual tree, which are necessary procedures for computing a quadrangu ...

15 Face fixer: compressing polygon meshes with properties

Martin Isenburg, Jack Snoeyink

July 2000 **Proceedings of the 27th annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(1.00 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


Most schemes to compress the topology of a surface mesh have been developed for the lowest common denominator: triangulated meshes. We propose a scheme that handles the topology of arbitrary polygon meshes. It encodes meshes directly in their polygonal representation and extends to capture face groupings in a natural way. Avoiding the triangulation step we reduce the storage costs for typical polygon models that have group structures and property data.

Keywords: connectivity encoding, mesh compression

16 Quasi-greedy triangulations approximating the minimum weight triangulation

Christos Levcopoulos, Drago Krznaric

January 1996 **Proceedings of the seventh annual ACM-SIAM symposium on Discrete algorithms**

Full text available:  pdf(1.17 MB)

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17 On good triangulations in three dimensions

Tamal K. Dey, Chanderjit L. Bajaj, Kokicki Sugihara

May 1991 **Proceedings of the first ACM symposium on Solid modeling foundations and CAD/CAM applications**


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18 Numerical stability of algorithms for 2D Delaunay triangulations

Steven Fortune

July 1992 **Proceedings of the eighth annual symposium on Computational geometry**

Full text available:  [pdf\(910.51 KB\)](#)


Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We show that two Delaunay triangulation algorithms, a diagonal-flipping algorithm and an incremental algorithm, can be implemented in approximate arithmetic. The two algorithms have worst-case running time $O(n^2)$ on a set of n sites. The correctness assertion is that the algorithms produce a triangulation of the set of sites so that each triangle has an "almost empty" circumcircle, i.e., a circumscribing pseudo ...

19 Triangulation and CSG representation of polyhedra with arbitrary genus

Tamal K. Dey

June 1991 **Proceedings of the seventh annual symposium on Computational geometry**


Full text available:  [pdf\(852.72 KB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

20 Triangulation: A multi-resolution topological representation for non-manifold meshes

Leila De Floriani, Paola Magillo, Enrico Puppo, Davide Sobrero

June 2002 **Proceedings of the seventh ACM symposium on Solid modeling and applications**

Full text available:  [pdf\(299.21 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We address the problem of representing and processing non-regular, non-manifold two-dimensional simplicial meshes, that we call triangle-segment meshes, at different levels of detail. Such meshes are used to describe spatial objects consisting of parts of mixed dimensions, and with a non-manifold topology. First, we describe a multi-resolution model for non-regular, non-manifold meshes, that we call a Non-manifold Multi-Tessellation (NMT). We consider the selective refinement query, which is at ...

Keywords: data structures, multiresolution, non-manifold modeling

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